FIG. 1. MEMBRANE DESICATION HEAT PUMP
GENERAL CONCEPT

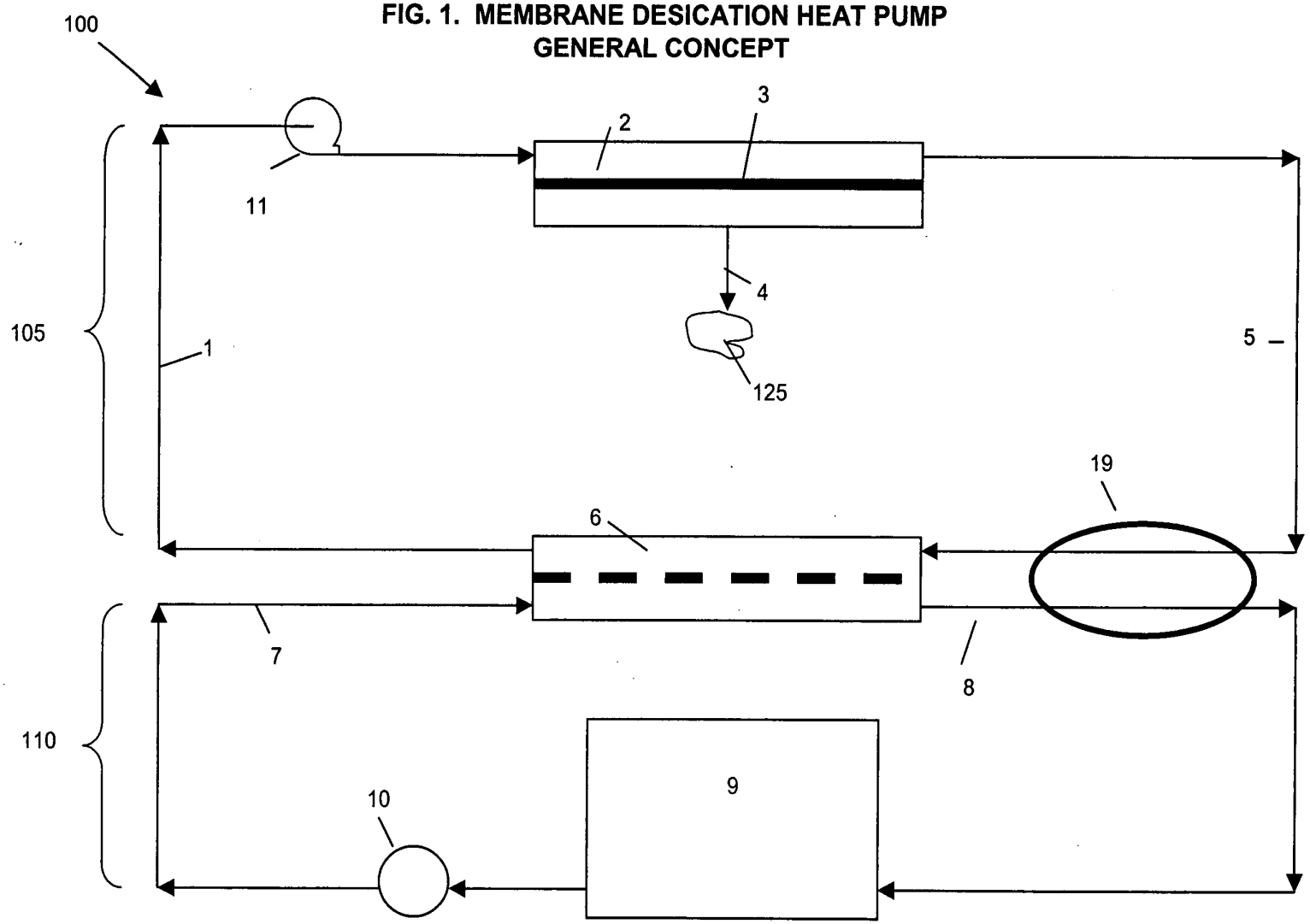

FIG. 2A. MIXED PERMEATE FLOW

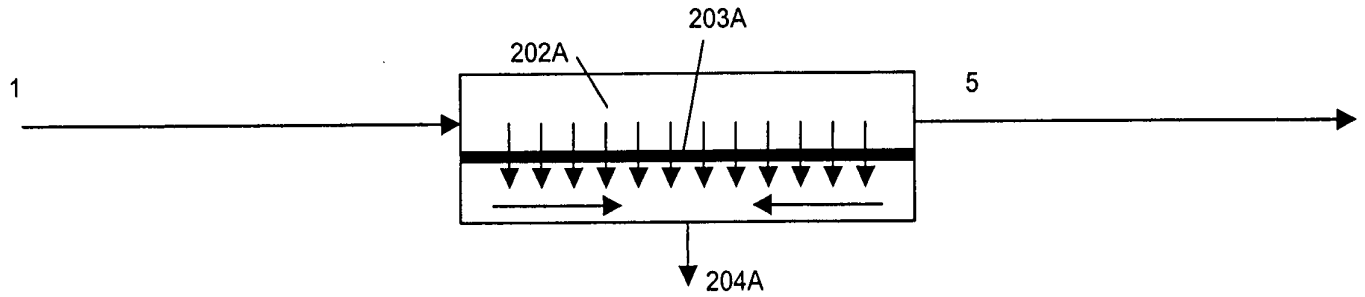

FIG. 2B. COCURRENT PERMEATE FLOW

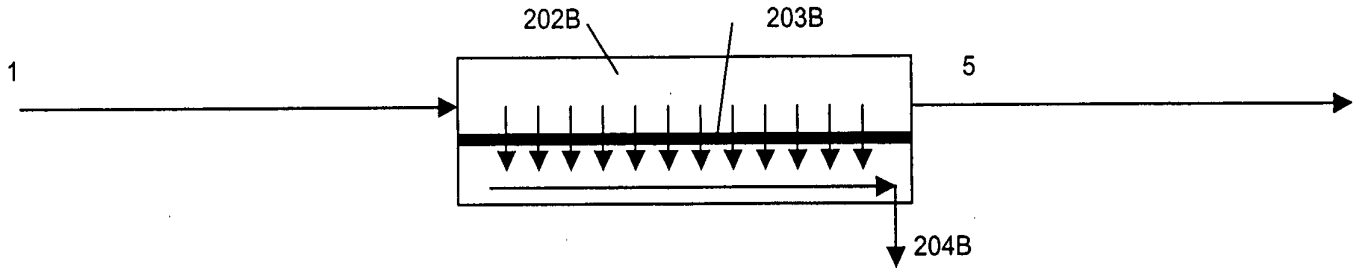

FIG. 2C. COUNTERCURRENT PERMEATE FLOW

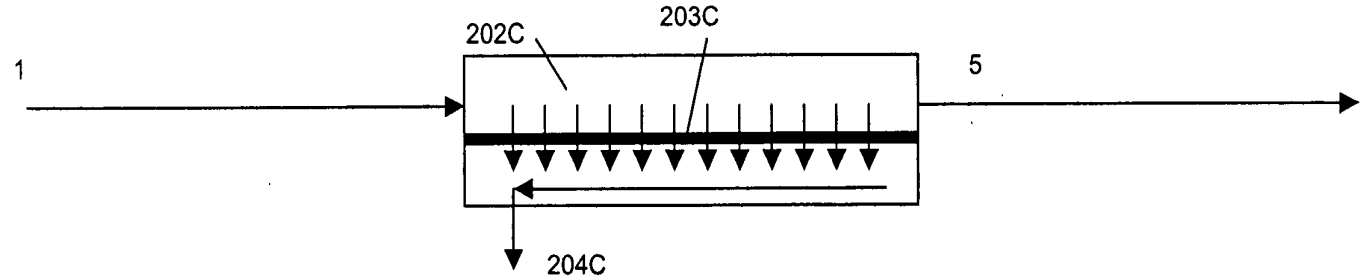

FIG. 3A
VACUUM

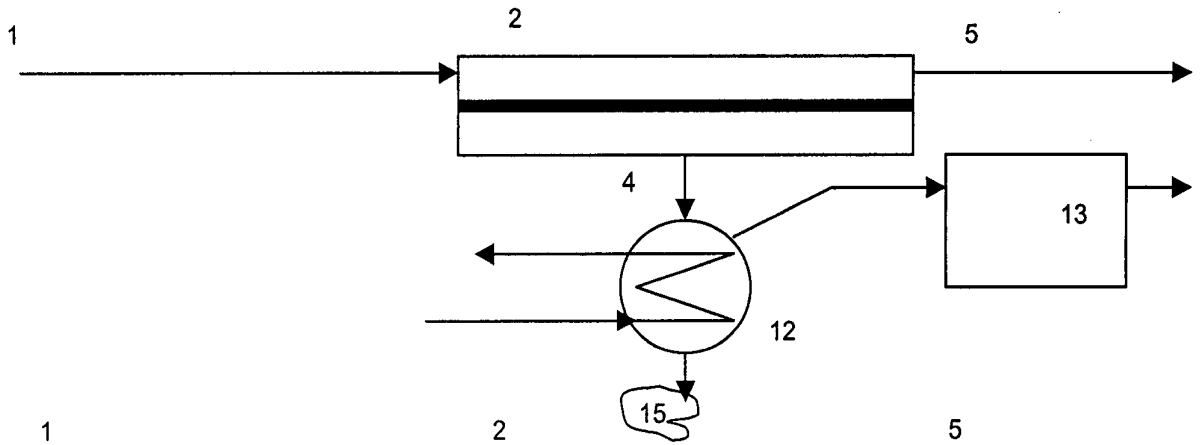

FIG. 3B
REFLUX

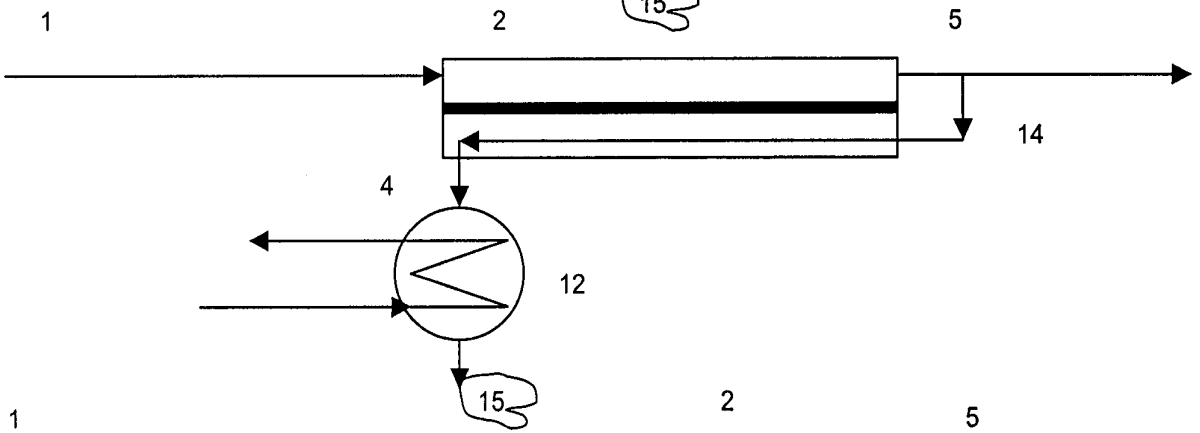

FIG. 3C
SWEEPING

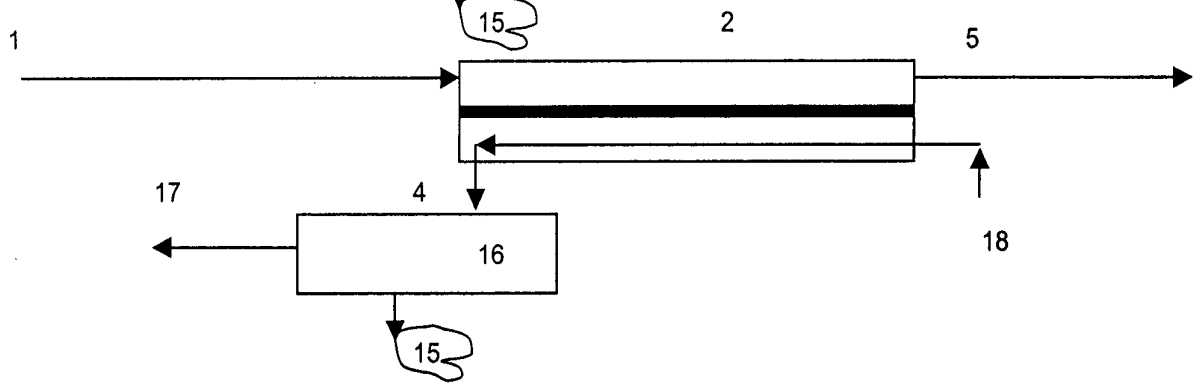

FIG. 4. HEAT PUMP - OPEN CYCLES

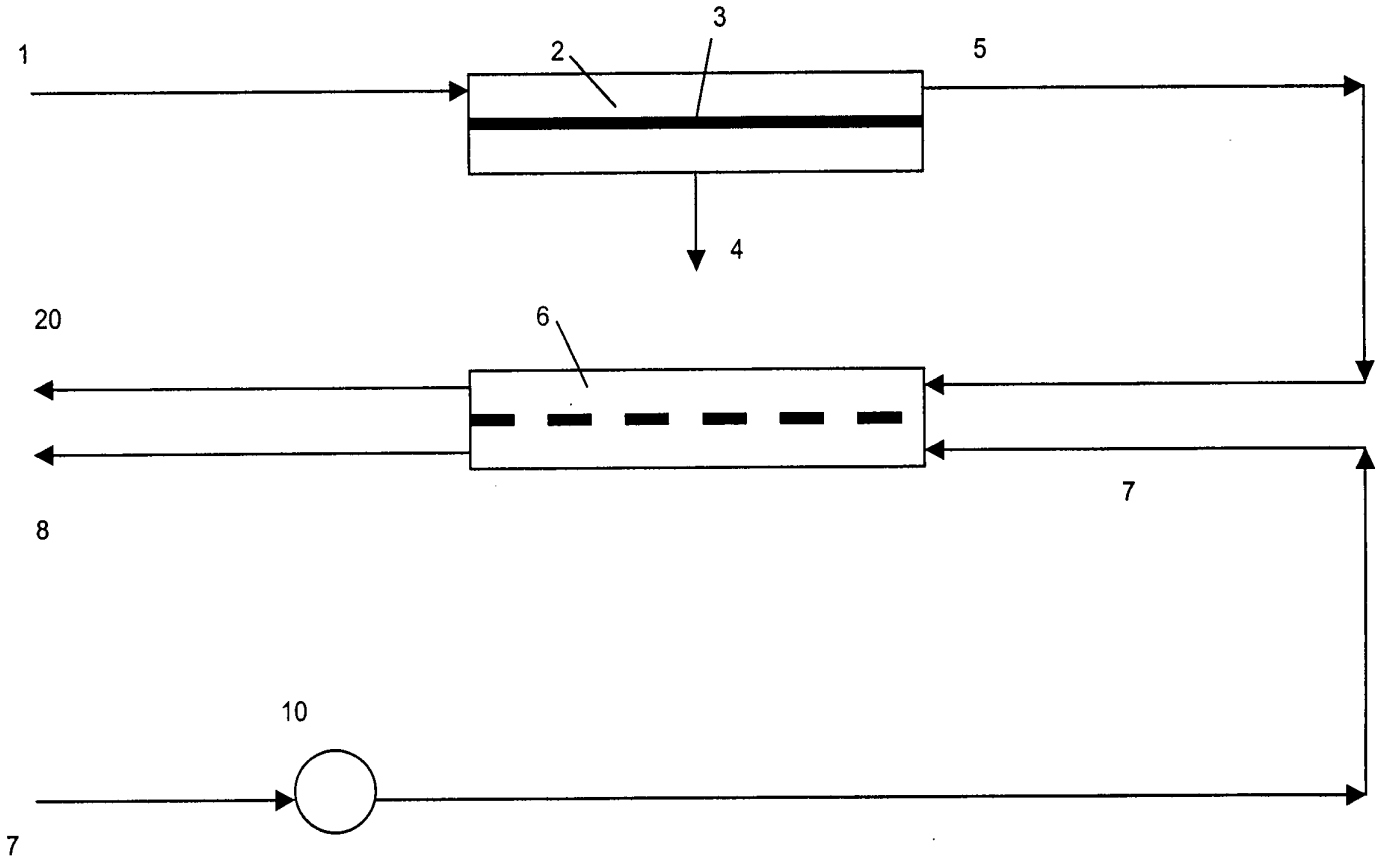

FIG. 5. OPEN CYCLE GAS CHILLING / AIR CONDITIONING

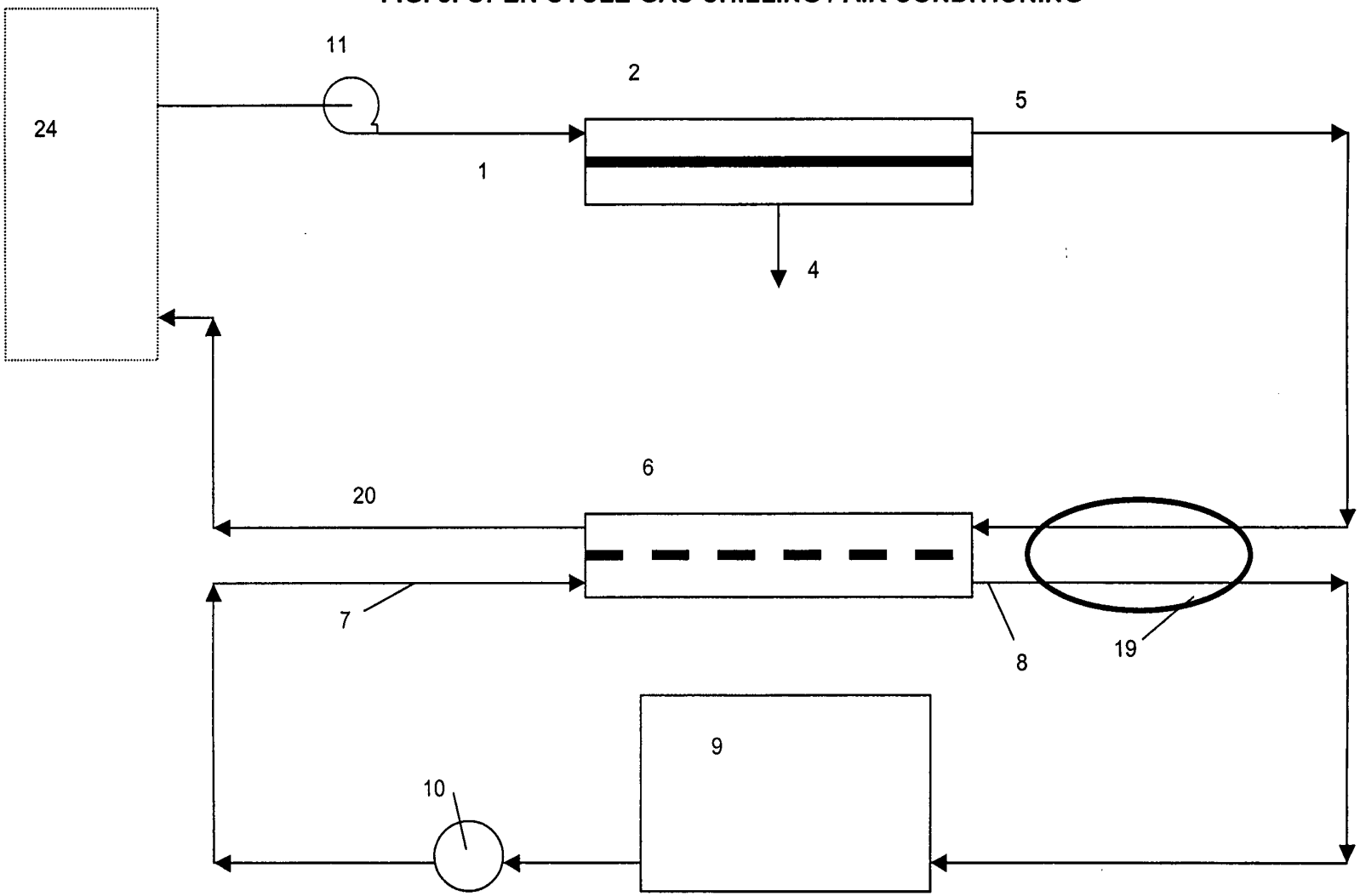

FIG. 6. LIQUID CHILLING - OPEN CYCLE

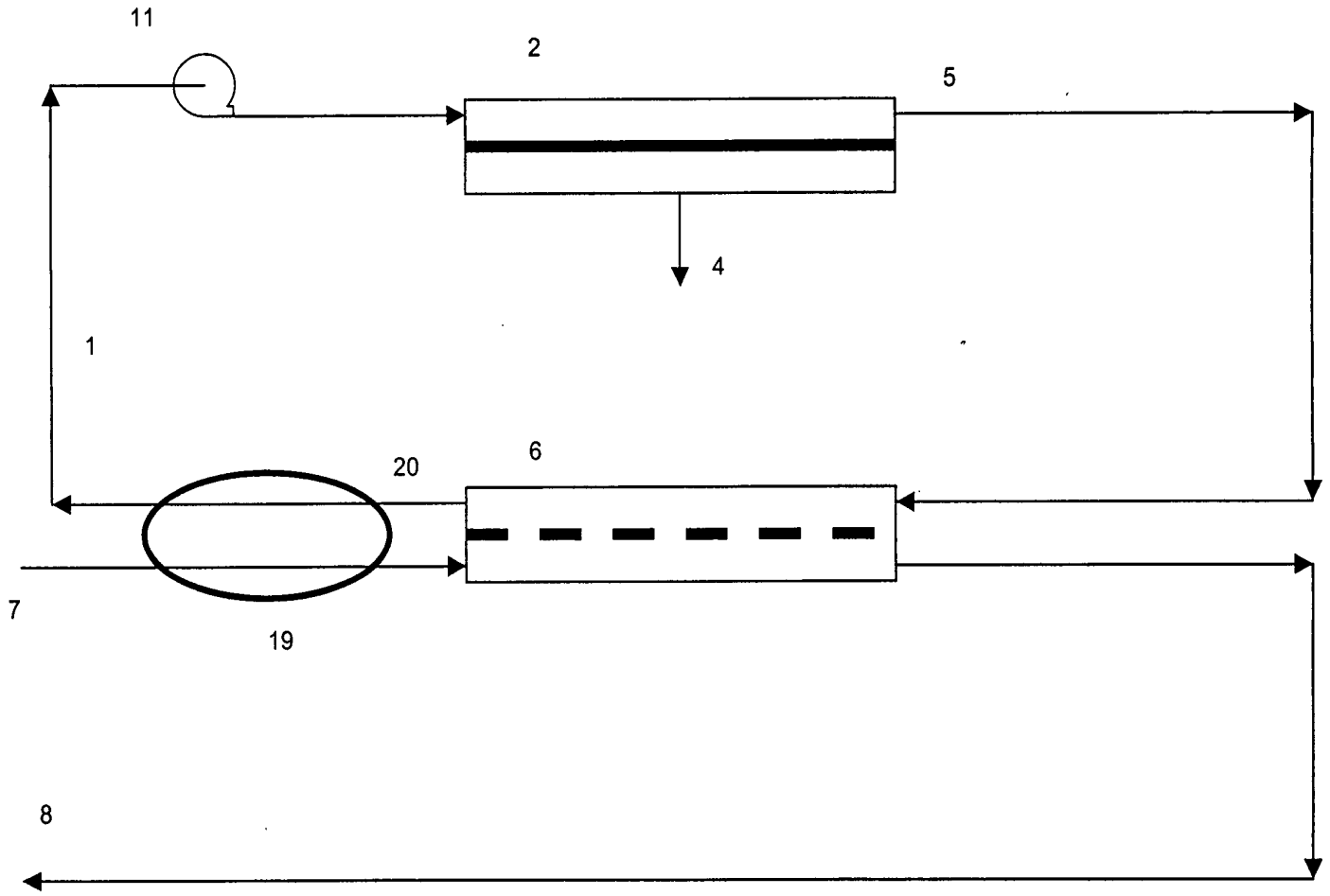

FIG. 7. GAS CHILLING - CLOSED CYCLE

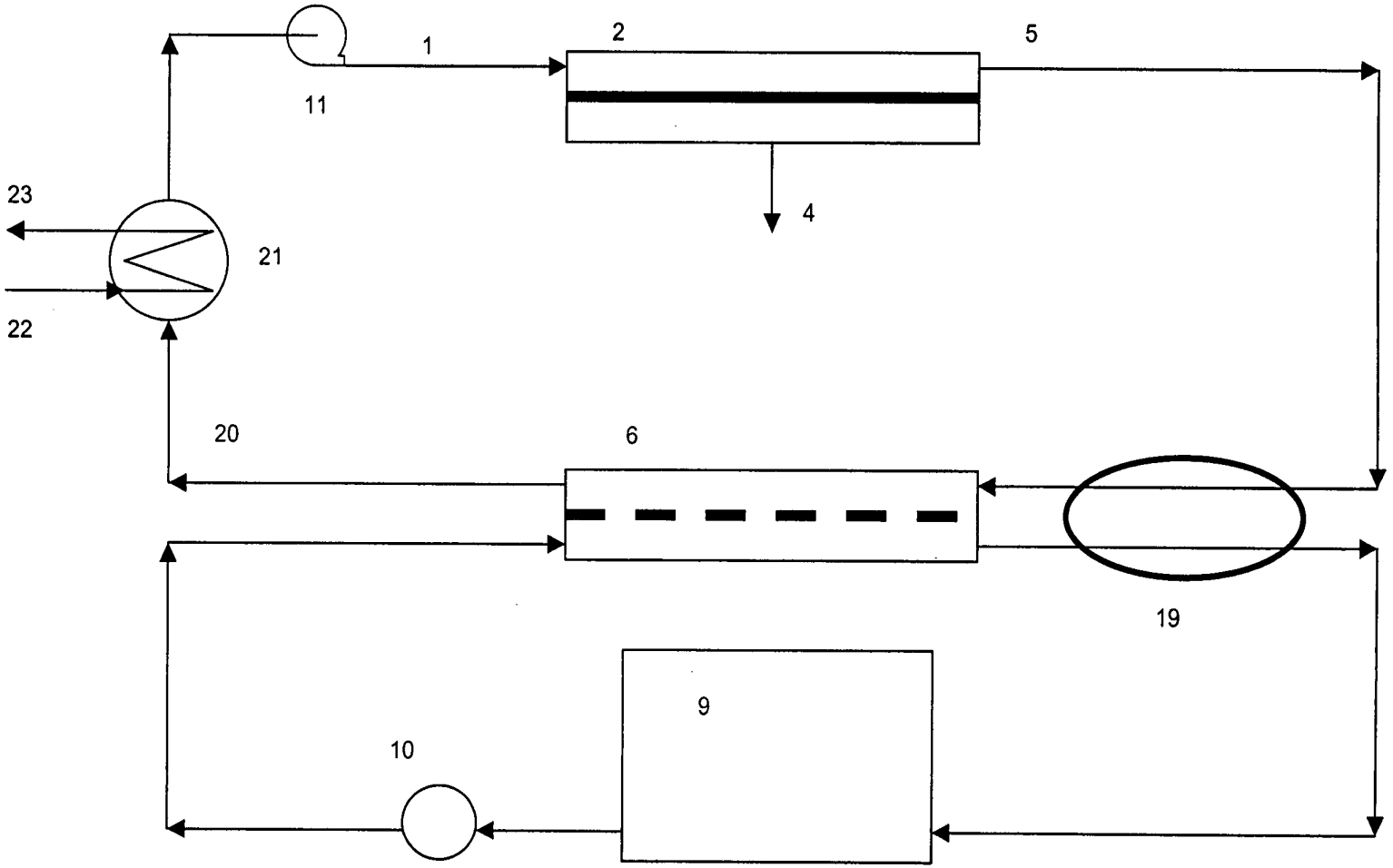

FIG. 8. CLOSED CYCLE LIQUID CHILLING

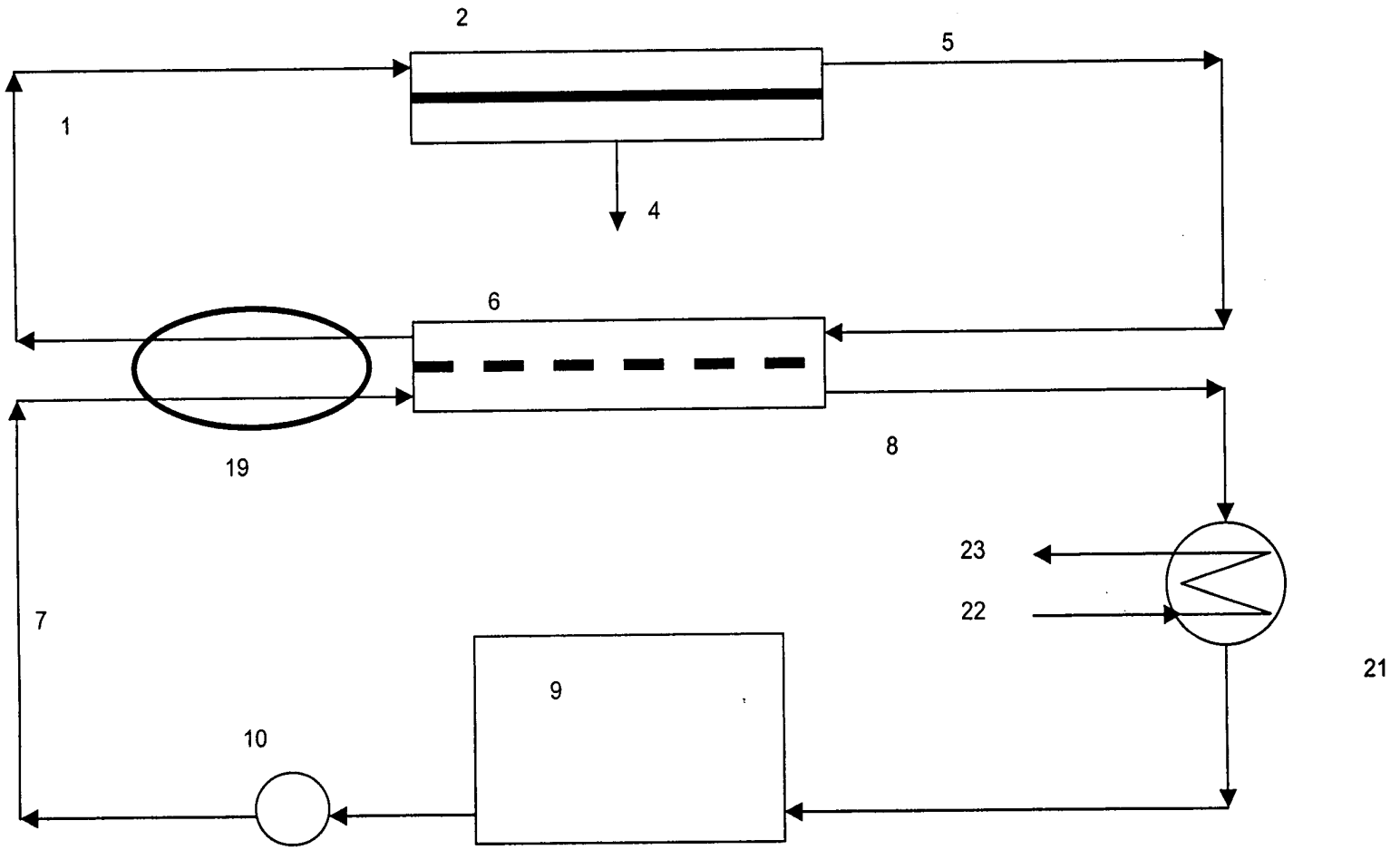

FIG. 9. GAS CHILLING/AIR CONDITIONING + VAPOR CONTENT CONTROL

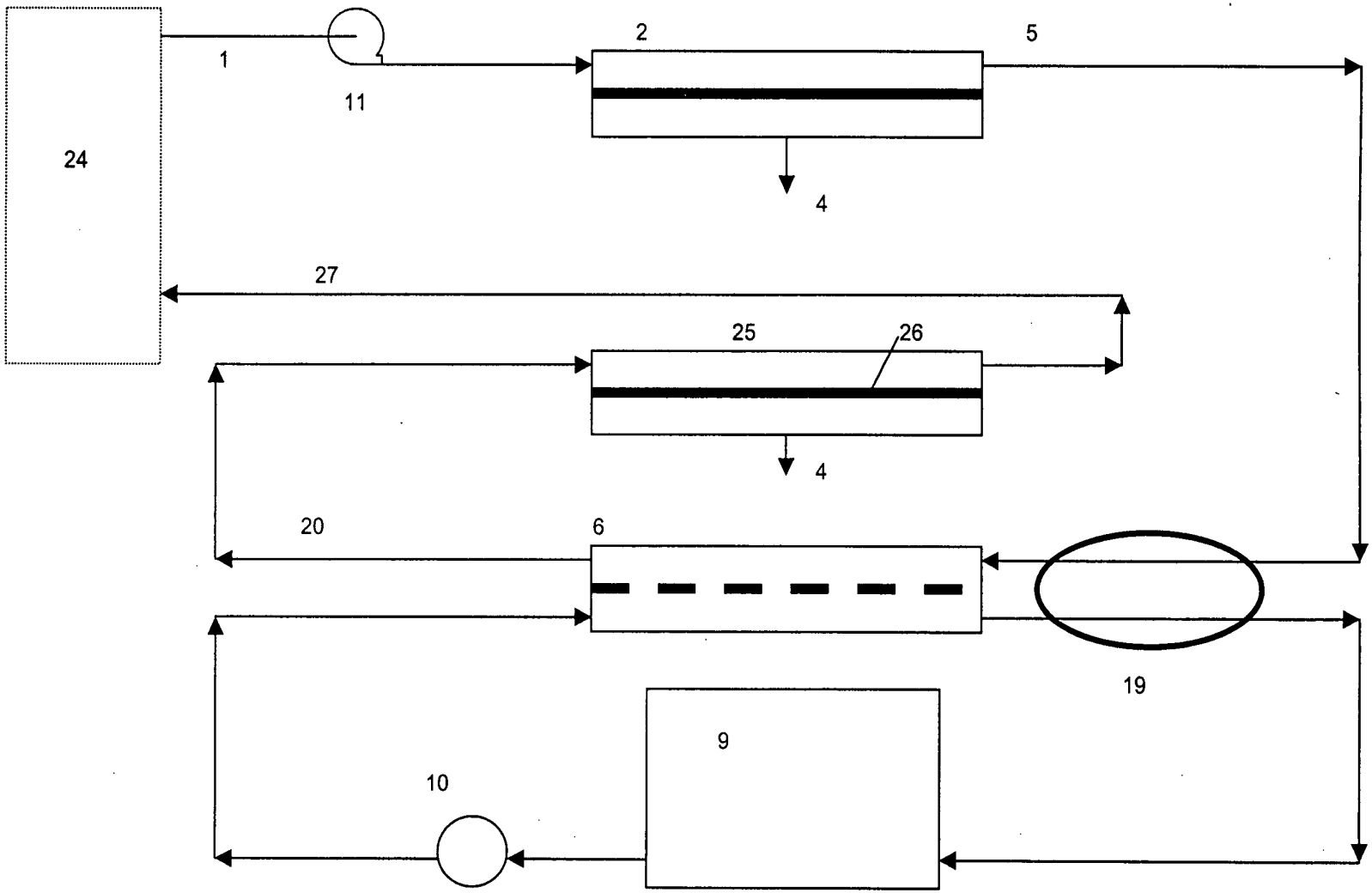

FIG. 10. LIQUID CHILLING - OPEN CYCLE Q IN

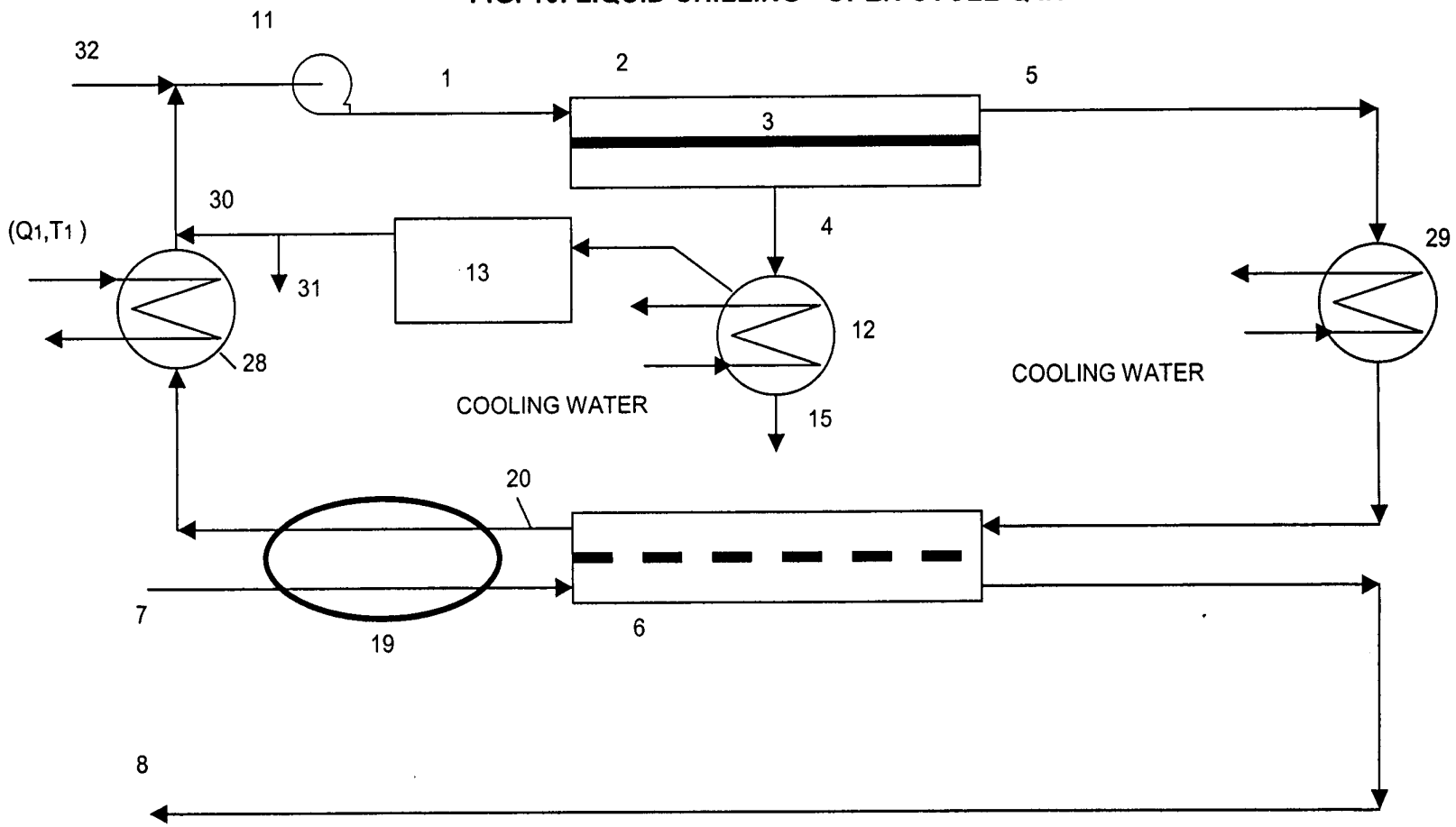

FIG. 11. LIQUID CHILLING - OPEN CYCLE + REFLUX

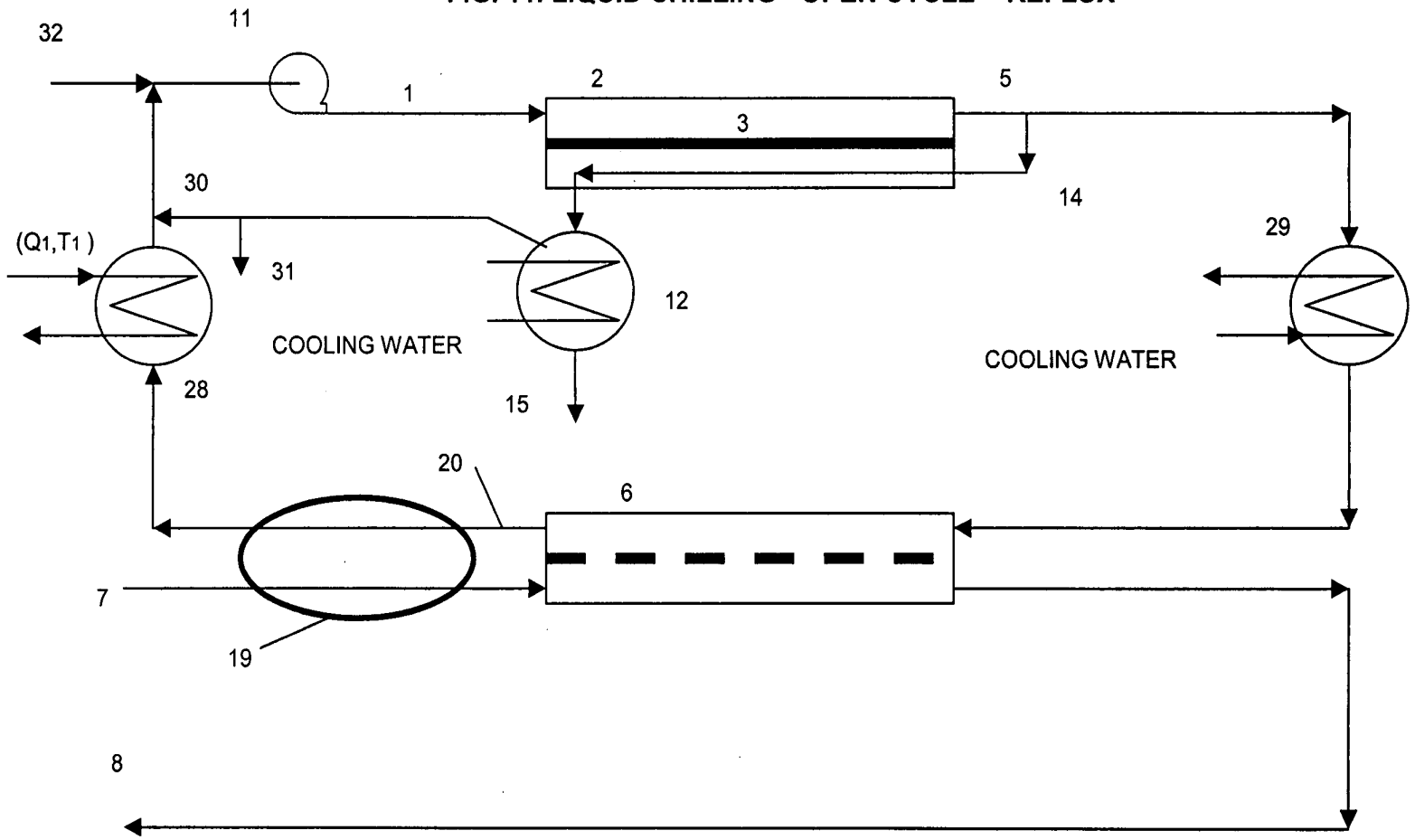

FIG. 12. AIR CONDITIONING - DETAILED

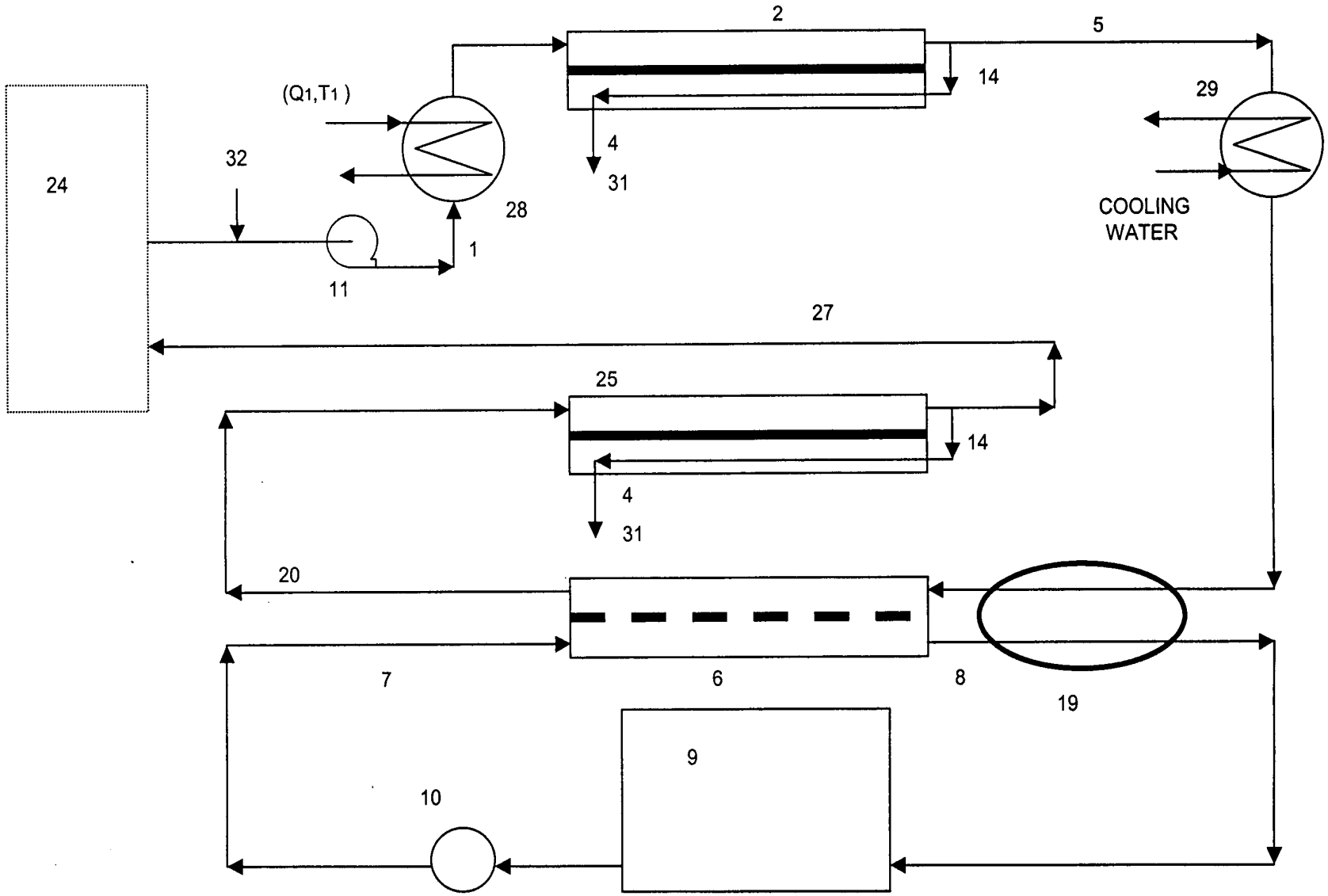

FIG. 13. MEMBRANE HEAT PUMP
HEATING MODE

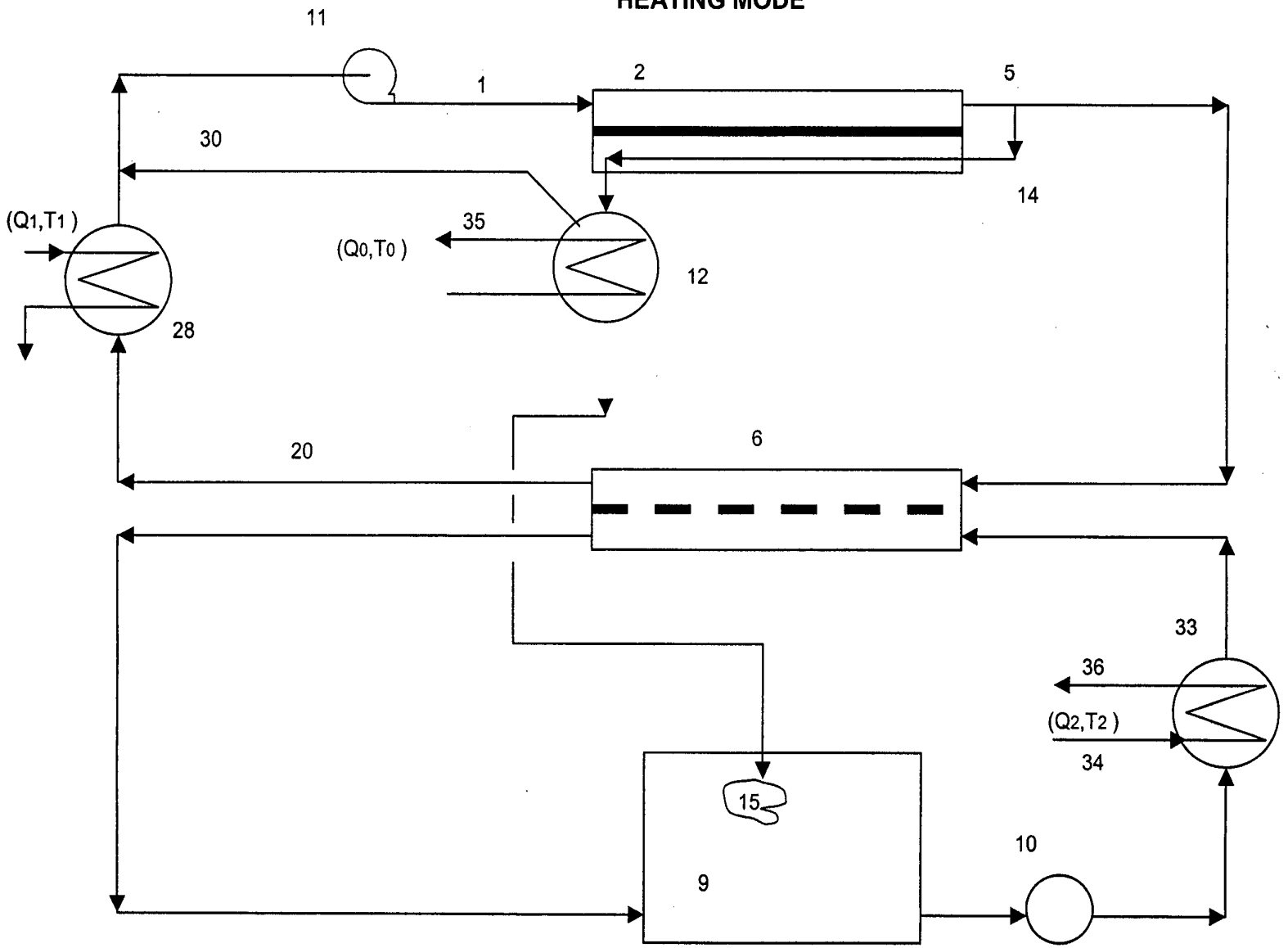

FIG. 14. MEMBRANE HEAT PUMP
HEATING MODE

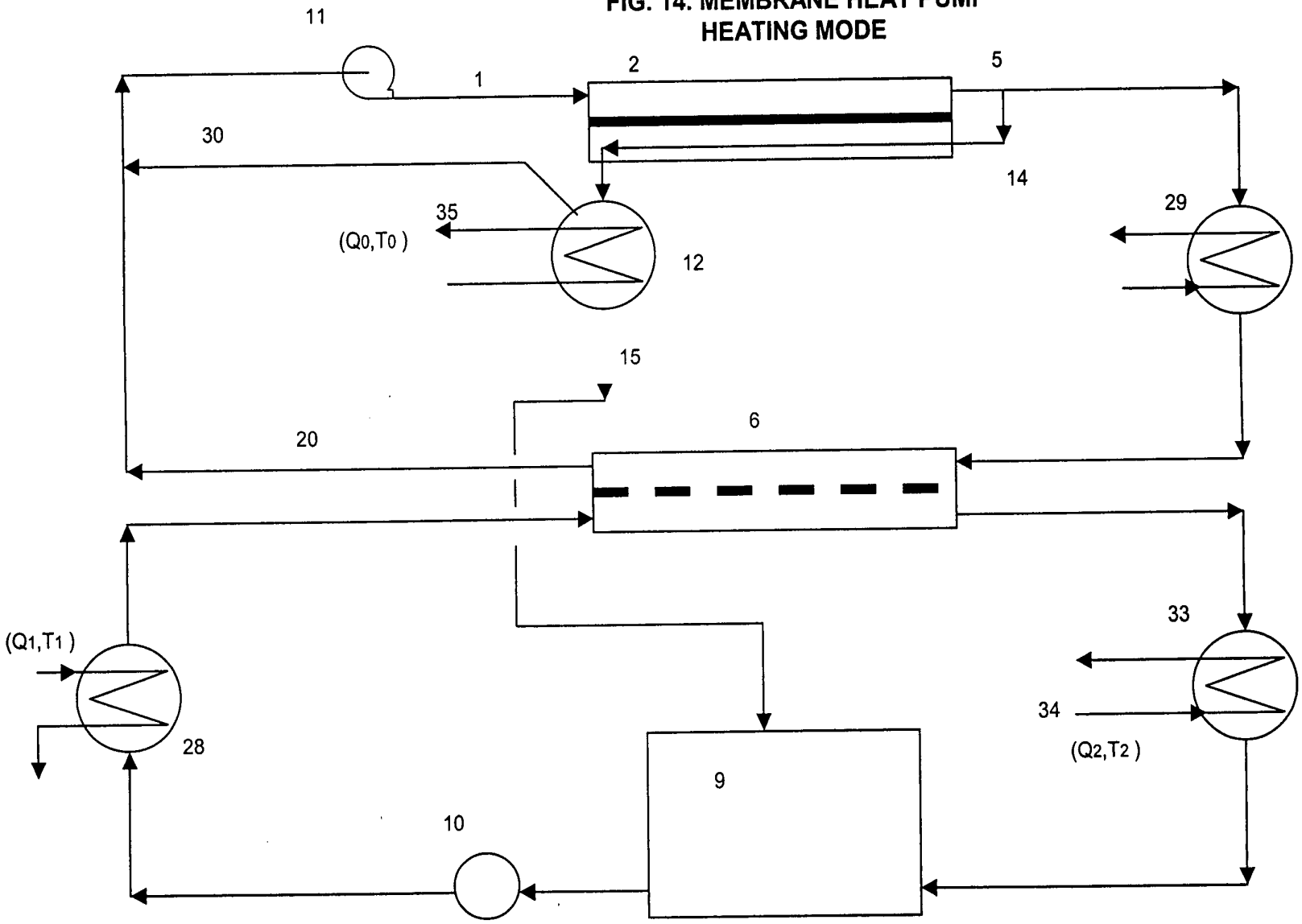

FIG. 15. MEMBRANE HEAT PUMP
RECOVERING HEAT FROM A COOLING TOWER

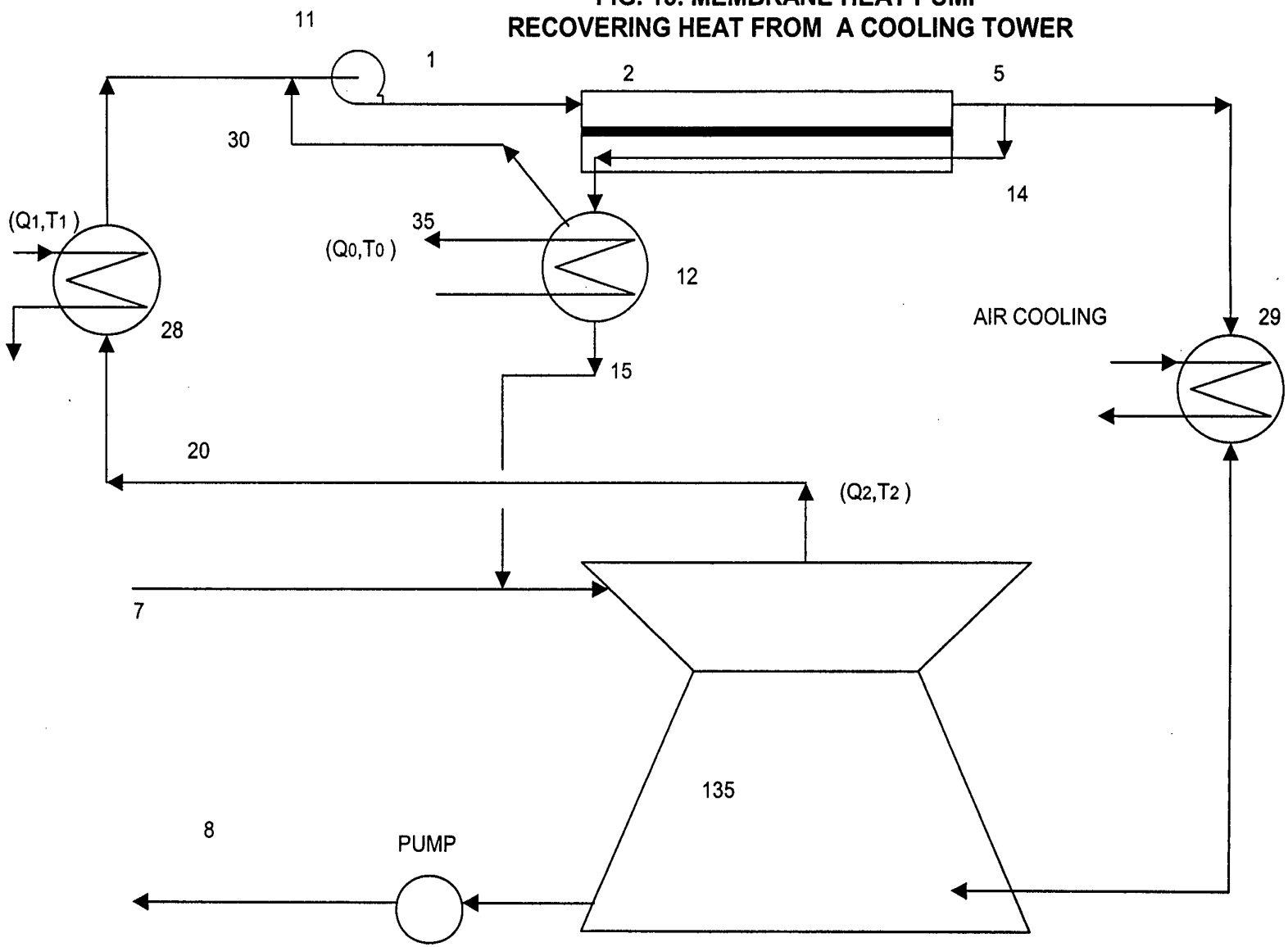

FIG. 16. MEMBRANE HEAT PUMP
RECOVERING HEAT FROM A COOLING TOWER

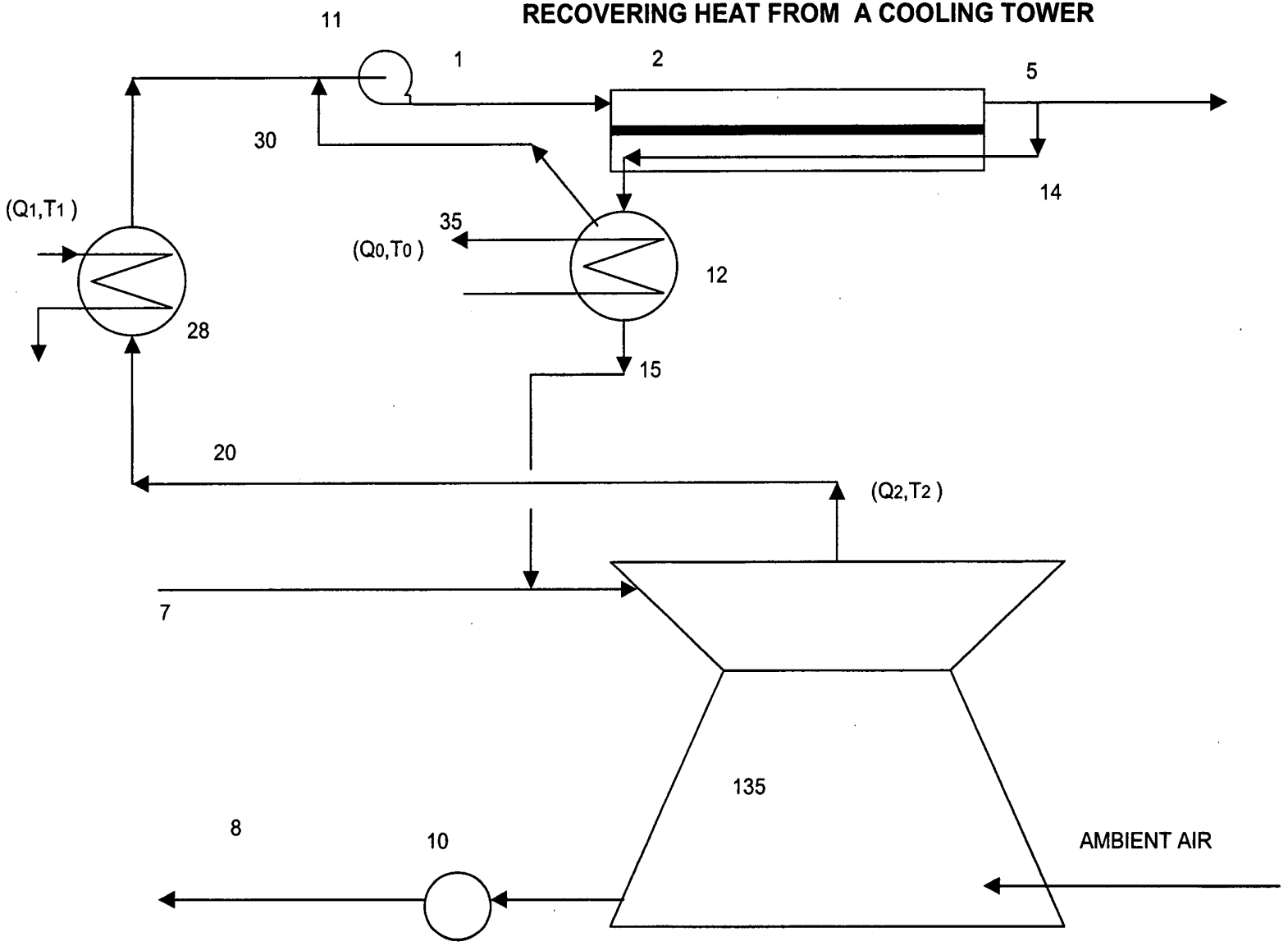

FIG. 17. HEAT PUMP PERFORMANCE

t_2 HEAT TAKING TEMPERATURE = 40 DEG C

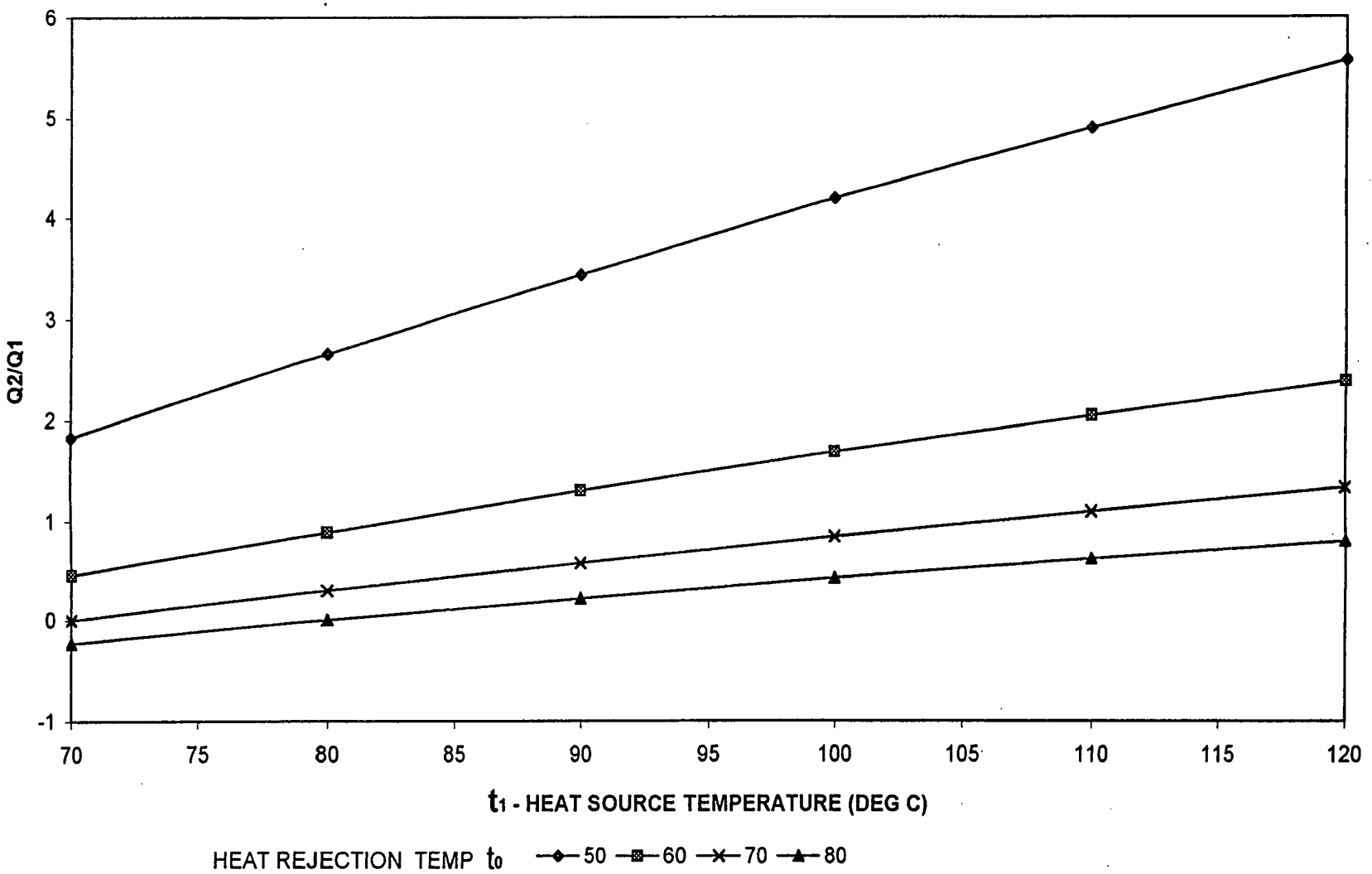

FIG. 18. HEAT PUMP PERFORMANCE

t_1 HEAT SOURCE TEMPERATURE = 120 DEG C

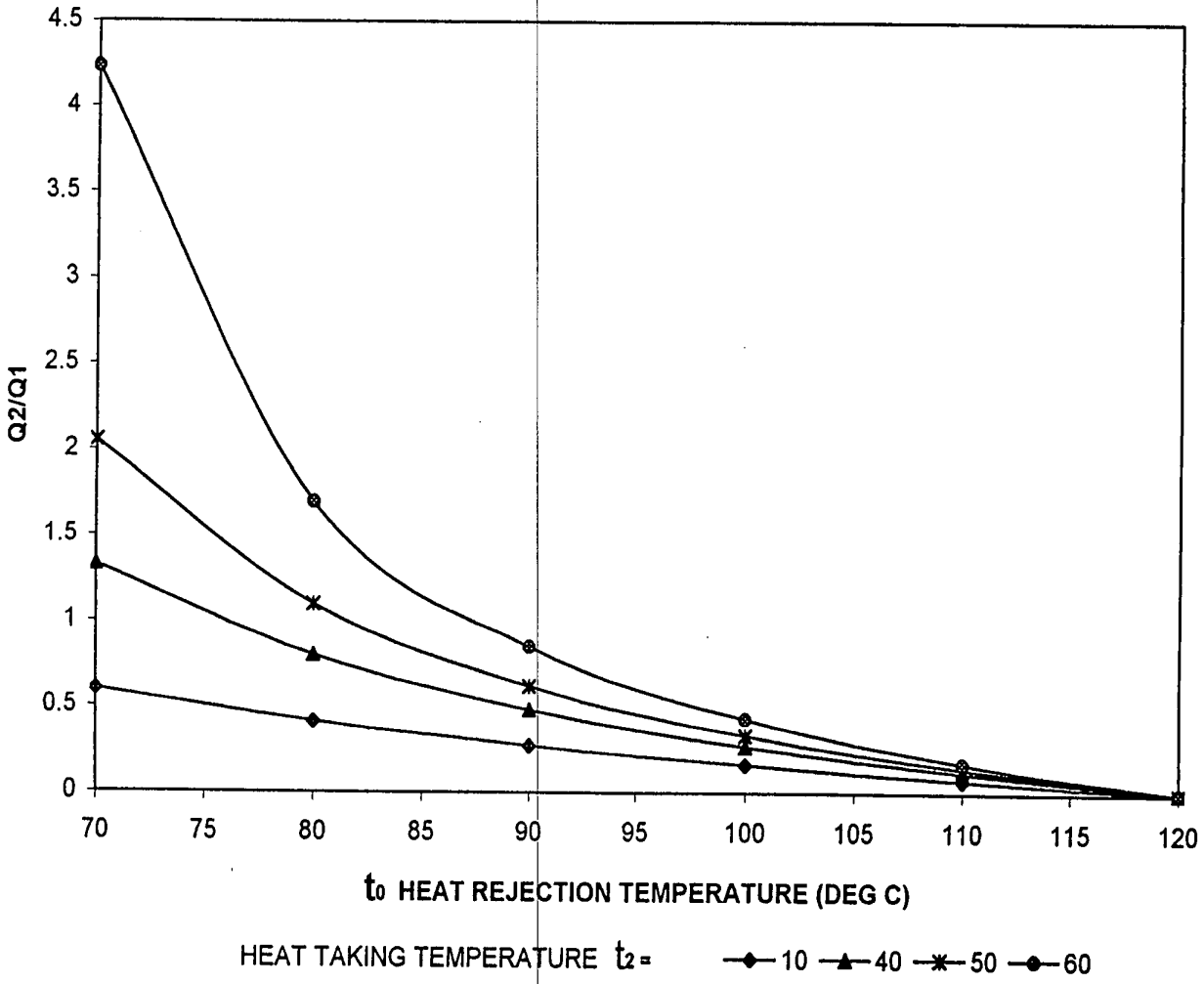

FIG. 19. MEMBRANE HEAT PUMP PROCESS SHOWN ON A PSYCHOMETRIC CHART

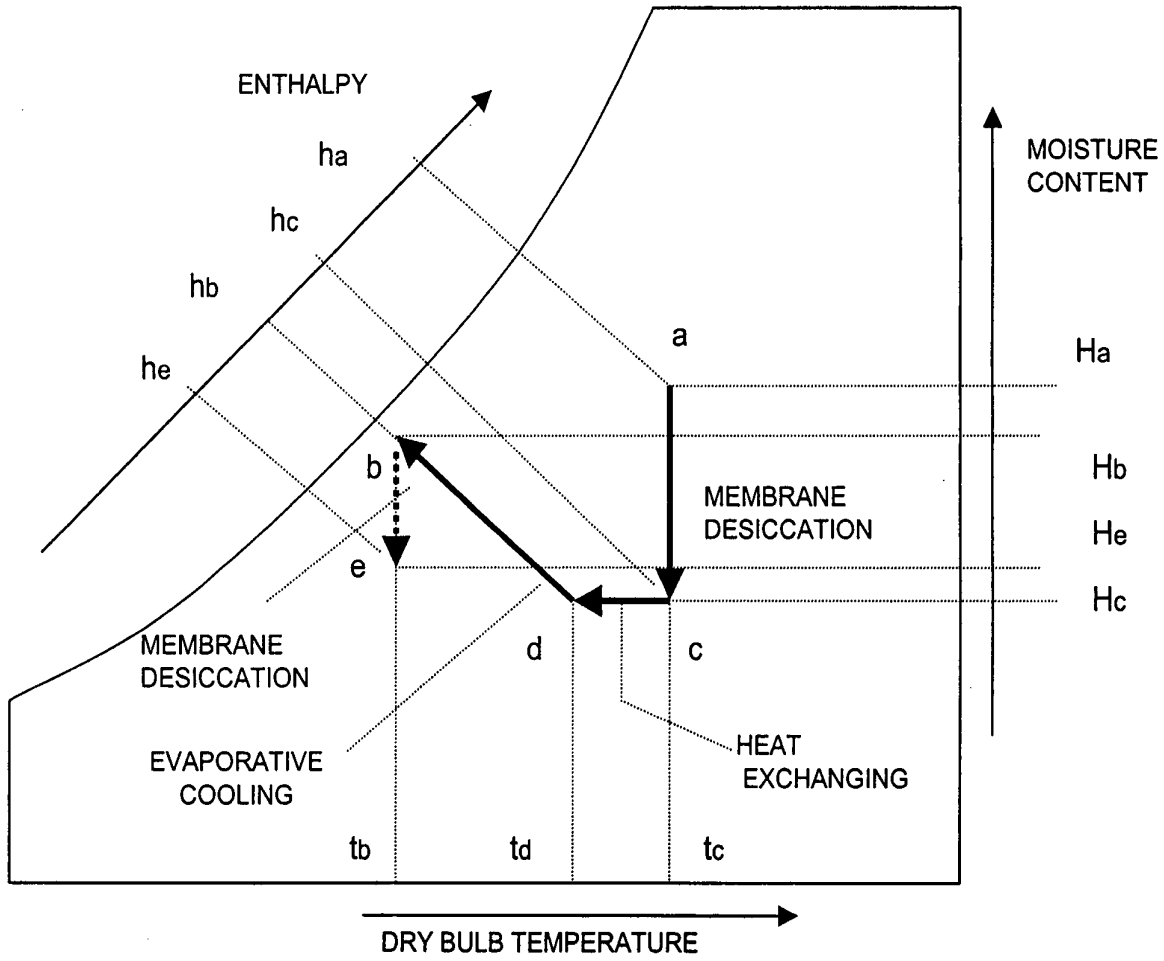

FIG. 20. CLOSED AIR CYCLE
SHOWN ON A PSYCHOMETRIC CHART

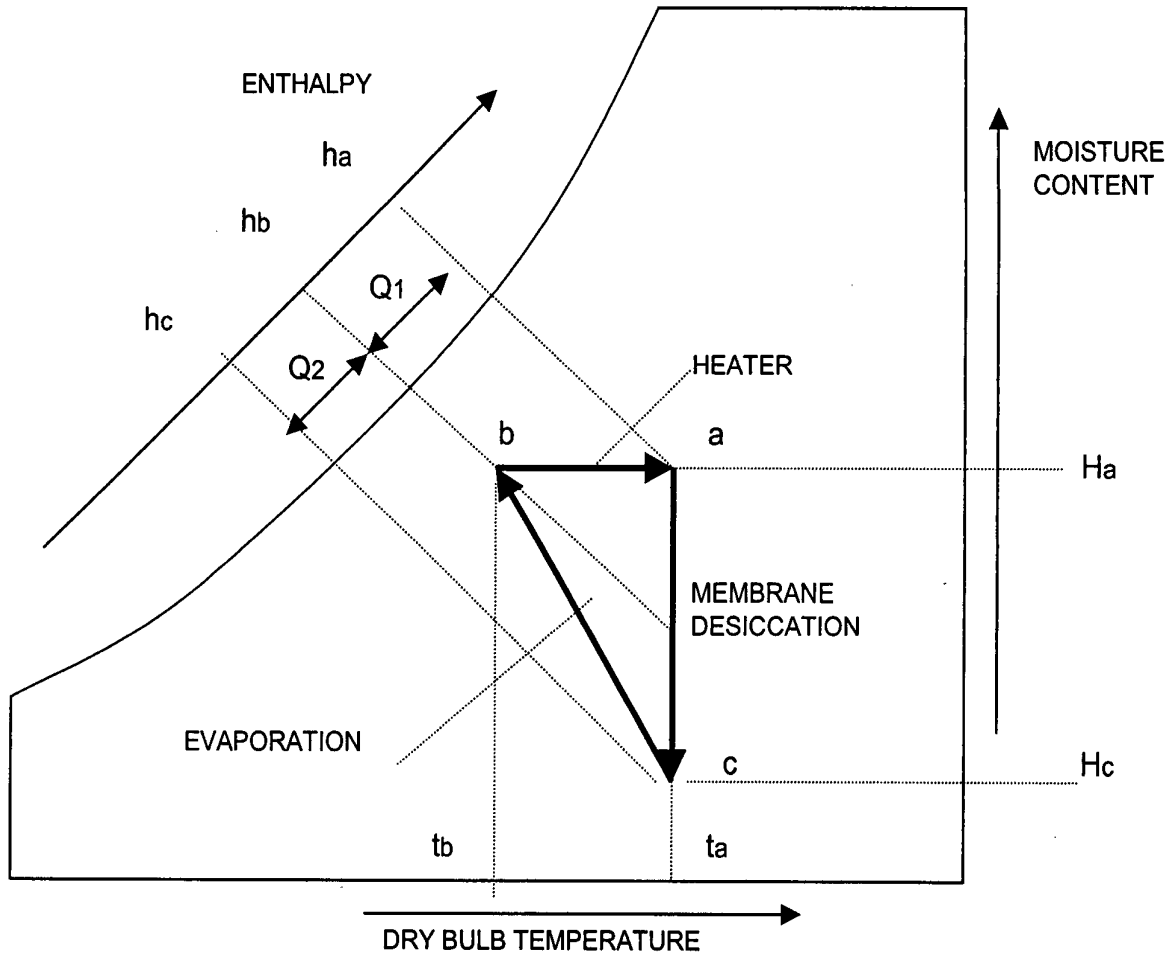

FIG. 21. MEMBRANE HEAT PUMP PROCESS FOR WASTE HEAT RECOVERY SHOWN ON A PSYCHOMETRIC CHART

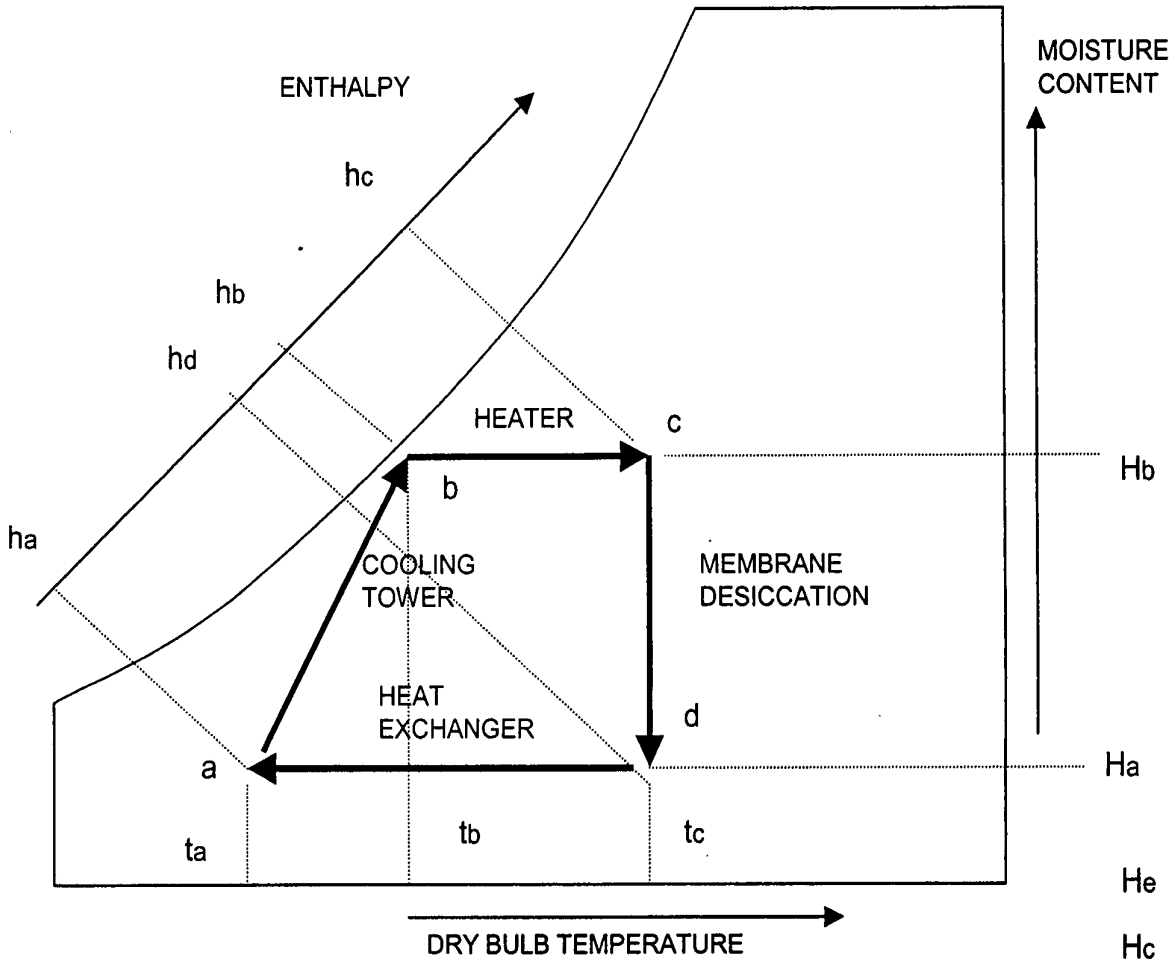

FIG. 22. OPEN CYCLE MEMBRANE HEAT PUMP PROCESS FOR WASTE HEAT RECOVERY SHOWN ON A PSYCHOMETRIC CHART